

4.0 AFFECTED ENVIRONMENT

The environment of the Hanford Site has been described in several environmental reports, EISs, and EAs. The affected environment has been summarized from PNNL-6415, unless otherwise noted. The ATCD Project would be conducted in the 200 East Area of the Hanford Site.

4.1 GEOLOGY AND SOILS

The Hanford Site is underlain by basalt flows. Sedimentary layers referred to as the suprabasalt sediments lie on top of the basalt flows. A relatively thin layer of silt, sand, and gravel is found on the surface across much of the site. Soil in the 200 Areas consists of sand, loamy sand, and sandy-loam soil types. The Hanford Site is in an area of low seismic activity compared to other portions of the Pacific Northwest. The production of grout for this demonstration would not require material from any onsite borrow sites.

4.2 SURFACE WATER RESOURCES

There are no naturally occurring water bodies (including wetlands) or designated floodplains near C tank farm. The Hanford Site and the surrounding communities draw all or most of their water from the Columbia River, which is about 9.0 km (5.6 mi) from the ATCD Project site.

4.3 GROUNDWATER RESOURCES

The Hanford Site groundwater resource includes the vadose zone and the underlying water table. There is substantial cesium-137 and cobalt-60 contamination in the vadose zone below tank C-106 (MACTEC, 2003). Other vadose zone contaminant plumes noted below the C tank farm (possible below C-106) include tritium, strontium-90, uranium, technetium-99, iodine-129, plutonium-239, and-240, arsenic, chromium, cyanide and nitrate (DOE/RL-92-19).

The Hanford Site groundwater resource includes the vadose zone and the underlying saturated water table. Unconsolidated glacial-fluvial sands and gravel of the Hanford formation make up most of the vadose zone material. The regional groundwater contaminant plume (tritium, iodine-129, technetium-99, and nitrate) has sources within the 200 East Area. Smaller groundwater plumes originating from the 200 East Area include uranium, strontium-90, antimony, cadmium, thallium and pentachlorophenol (PNNL-14187). Groundwater monitoring data from the WMA C indicated that nitrate levels are increasing but do not exceed the drinking water standard (45 milligrams per liter (mg/l), technetium-99 exceeds the drinking water standard (900 pCi/l) and levels continue to increase, and cyanide is present at low concentrations (<0.00018 mg/l) (PNNL-14187).

The sources of this vadose zone and groundwater contamination are most likely the result of surface spills and leaks in nearby subsurface pipelines. Historical leaks from C-106 cannot be ruled out as a potential source, but comparisons between 1993 and 1997 data indicate that C-106 did not leak. Tank C-106 has not been interim stabilized and is currently considered sound (MACTEC, 2003).

4.4 AIR RESOURCES

The *Clean Air Act* (CAA), as amended, requires that the U.S. Environmental Protection Agency (EPA) develop a national air operating permit program, including provisions for state programs to be authorized by EPA to issue permits for major sources of regulated pollutants. In 1994, the EPA approved the Washington State Air Operating Permit Regulation, promulgated as “Operating Permit Regulation” (WAC 173-401). This program, administered by the Washington State Department of Health, includes the regulation of federal facilities to the extent provided for in Section 118 of the CAA, 42 USC § 7418, including the DOE Site-Wide air-operating permit for the Hanford Site. Air quality at the Hanford Site is generally good with an occasional exception due to blowing dust or brush fires.

4.5 BIOLOGICAL RESOURCES

The Hanford Site is one of the largest shrub-steppe vegetation areas remaining in Washington State, and nearly half of the site’s 1,520-km² (586-mi²) area is designated as ecological study areas or refuges. Shrub-steppe areas are considered priority habitat by Washington State because of their relative scarcity and their importance to wildlife species. The undisturbed portions of the 200 Areas consist mostly of shrub-steppe habitat. The dominant plants on the Central Plateau are big sagebrush, rabbitbrush, cheatgrass, and Sandburg’s bluegrass. Cheatgrass provides half of the total plant cover.

Most of the waste disposal and tank farm sites are covered by non-native vegetation (e.g., crested or Siberian wheatgrass). These species stabilize surface soil, control soil moisture, or displace invasive deep-rooted species. Waste disposal and tank farm sites are kept in a vegetation-free condition with the use of herbicides (PNNL-6415). The ATCD Project would affect about 4,000 m² (1 acre) of land along the northeast corner of the C tank farm. The ATCD staging area is a graded, graveled area that does not currently support native vegetation or wildlife species.

A biological survey of the 200 East and West areas was conducted in May 2003. A letter report of the findings of this survey is presented in Appendix B.

4.5.1 Threatened and Endangered Species

Threatened and endangered plants and animals identified on the Hanford Site, as listed by the federal government (“Endangered and Threatened Wildlife and Plants,” 50 CFR 17) and Washington State (Washington Natural Heritage Program 2002), are presented in Table 4-1. While these species are known to occur on the Hanford Site, they have not been reported in the vicinity of the C tank farm or on the land the ATCD Project would use for staging component closure activities.

Table 4-1. Federal- or Washington State-Listed Threatened (T), Endangered (E), Candidate (C) and Species of Concern (SC) Occurring on the Hanford Site

Common Name	Scientific Name	Federal ^(a)	State ^(b)
Plants			
Columbia milkvetch	<i>Astragalus columbianus</i>		T
Dwarf evening primrose	<i>Camissonia pygmaea</i>		T
Hoover's desert parsley	<i>Lomatium tuberosum</i>		T
Loeflingia	<i>Loeflingia squarrosa</i>		T
Persistent sepal yellowcress	<i>Rorippa columbiae</i>		T
Umtanum desert buckwheat	<i>Eriogonum codium</i>	C	E
White Bluffs bladderpod	<i>Lesquerella tuplashensis</i>	C	E
White eatonella	<i>Eatonella nivea</i>		T
Fish			
Spring-run chinook	<i>Oncorhynchus tshawytscha</i>	E	C
Steelhead	<i>Oncorhynchus mykiss</i>	E	C
Bull Trout	<i>Salvelinus confluentus</i>		SC
Birds			
American white pelican	<i>Pelecanus erythrorhynchos</i>		E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T
Ferruginous hawk	<i>Buteo regalis</i>		T
Sandhill crane	<i>Grus canadensis</i>		E
Greater sage grouse	<i>Centrocercus urophasianus phaios</i>	C	T
Vaux's Swift	<i>Chaetura vauxi</i>		SC
Lewis Woodpecker	<i>Melanerpes lewis</i>		SC
Willow Flycatcher	<i>Empidonax traillii</i>		SC
Olive-sided Flycatcher	<i>Contopus cooperi</i>		SC
Common Loon	<i>Gavia immer</i>		SC
Northern Goshawk	<i>Accipiter gentilis</i>		SC
Burrowing Owl	<i>Athene cunicularia</i>		SC
Loggerhead Shrike	<i>Lanius ludovicianus</i>		SC
Animals			
Washington Ground Squirrel	<i>Spermophilus washington</i>		SC
Pygmy Rabbit	<i>Brachylagus idahoensis</i>		SC
Sagebrush Lizard	<i>Sceloporus graciosus</i>		SC

^(a) 50 CFR 17 (www.fws.gov).^(b) Washington Natural Heritage Program 2002 (www.wa.gov/dnr/htdocs/fr/nhp/wanhp.html)

Source: PNNL-6415, 2002

4.6 LAND USE

The ATCD Project would be consistent with current land use as defined by the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE/EIS-0222F) and its associated Record of Decision (64 FR 61615). The Central Plateau (200 East and West Areas) was designated as an "industrial-exclusive" area capable of supporting waste treatment, storage, and/or disposal activities for hazardous, dangerous, radioactive, nonradioactive wastes and related activities.

Under the Farmland Protection Policy Act (7 USC 4201) the Natural Resource Conservation Service designates some areas as prime farmland. No lands in the ATCD Project area are designated as prime farmland (DOE/EIS-0222F).

4.7 TRANSPORTATION

The Tri-Cities serves as a regional transportation and distribution center with major air, land, and river connections. The majority of air passenger and freight services in the local area go through the Tri-Cities Airport located in Pasco, Washington. Both Richland and Kennewick have small airports serving general aviation. The ports of Benton, Kennewick, and Pasco use the commercial waterways of the Snake and Columbia Rivers to provide access to the deep-water ports of Portland, Oregon and Vancouver, Washington. Burlington Northern Santa Fe, Union Pacific, and Amtrak provide rail service to the Tri-Cities.

DOE maintains a paved two-lane road network within the Hanford Site that provides access to the various work centers. The primary access roads on the Site are Routes 2, 4, 10, and 11A. Primary access to the 200 Areas is by Route 4 South from Richland. Public access to the 200 Areas and interior locations of the Hanford Site has been restricted by manned gates at the Wye Barricade and the Yakima Barricade (at the intersection of State Route 240 and Route 11A).

4.8 SOCIOECONOMICS

The Hanford Site is the largest single source of employment in the Tri-Cities. During fiscal year (FY) 2000, ORP and its prime contractors (CH2M HILL Hanford Group, Inc. and Bechtel National, Inc.) and the DOE Richland Operations Office and its prime contractors (Fluor Hanford, Inc. and its principal subcontractors); Pacific Northwest National Laboratory (PNNL); Bechtel Hanford, Inc.; and the Hanford Environmental Health Foundation employed an average of 10,000 to 11,000 employees. The work force for the ATCD Project would average approximately 20 workers. This represents less than 1% of the total labor force at the Hanford Site.

4.8.1 Utilities

The ATCD Project would not require construction or development of new utility lines. Existing services have adequate capacity to meet the needs of the ATCD Project.

The following utilities are currently available at C tank farm:

- SST electrical power system – The electrical power capacity available to C tank farm will be 1,000 kVA of 3-phase power at 13.8 kV and 60 Hz.
- SST raw water – The raw water available in the C tank farm flows through a 5 cm (2 in.) line to the 241-C-73 Air and Water Service Building at 1,000 kPa (145 lb/in.² gauge).
- SST service air system – The service air available to C tank farm is 0.7 m³/min (25 ft³/min) of dry compressed air with a dew point of -40 °C at 690 kPa (100-lb/in.² gauge).

4.8.2 Environmental Justice

The population within an 80-km (50-mi) radius around the Hanford Site includes 36% minority and Native American residents and 17.3% low-income residents (PNNL-6415). The 2000 low-income population was approximately 80,700 or 17% of the total population residing in the 50-mile radius of the Hanford Site. The majority of these households were located to the southwest and north of the site (Yakima and Grant counties) and in the cities of Pasco and Kennewick. (DOE/EIS-0286D2). Census data for 2000 identified members of the minority and Native American population as White Hispanic (24%), self-designated “other” races (54%), American Native (6%), two or more races (9%), Asians and Pacific Islanders (4%), and African American (3%). The ATCD Project would be conducted within the boundaries of the 200 East Area of the Hanford Site and specifically in areas in and adjacent to the tank farm systems.

4.9 HUMAN HEALTH AND SAFETY

The ATCD Project consists of short-term construction and operation activities. Operators would not come into physical contact with chemicals because they would be required to wear protective clothing. In addition, air monitoring and filtration would be used to identify and control any air emissions from C-106 during the period it is open for waste stabilization activities. All personnel working in C tank farm would receive appropriate health and safety training.

The hazards associated with these activities include potential occupational hazards resulting in physical trauma and radiological exposure resulting in latent cancer fatalities (LCFs). Initiating events that could result in hazardous health effects may include natural phenomena, human error, component failure, and spontaneous reactions. Health risks during normal conditions include anticipated exposure to radiation fields and radiological releases to the atmosphere during normal closure activities.

4.9.1 Occupational Accident Risk

Total occupational work hours at the Hanford Site for the 5-year period, 1997-2001, were about 56,230 worker-years (Solid Waste EIS). Occupational injury and illness incident rates for the Hanford Site ORP shows steady decrease from 1977 through 2000. Rates ranged from 3.0 cases per 200,000 worker hours (100 worker years) in 1997 to 1.7 cases in 2001.

4.9.2 Routine Radiological Exposure Risk

People have always been exposed to radiation from natural sources. The average resident of the United States receives an annual radiation dose from natural sources of about 300 mrem (0.3 rem). Exposure to large amounts of radiation (greater than 200,000 mrem [200 rem]) can cause serious illness or death. Although not confirmed by human studies, exposure to small doses of radiation, such as in medical x-rays, may cause a slight increase in the probability of cancer. At the Hanford Site, DOE activities have involved manmade radiation sources from nuclear processing. The DOE annual radiation dose standard for the public is 100 mrem (0.1 rem).

When estimating health effects for radiation protection purposes it can be assumed that, for low-level exposures (i.e., less than 20 rem), the risk of one latent cancer fatality is 6×10^{-4} per rem (DOE/EH-412/0015/0802 rev.1). For example, if 100,000 people receive a dose of 0.1 rem (100 mrem) or if 1,000,000 people receive a dose of 0.01 rem (10 mrem) six latent cancer fatalities would be expected.

ATCD Project activities require work in radiation zones. Due to the nature of radiation zone work, the workers could be exposed to and receive an occupational radiological dose from ionizing radiation. The DOE annual limit for occupational exposure is 5,000 mrem (5 rem). Hanford workers are administratively limited to an annual radiation dose of no more than 500 mrem.

4.10 CULTURAL RESOURCES

The Hanford Site as a whole contains extensive prehistoric and historic archaeological sites. However, the 200 Areas contain very few known sites. A comprehensive archaeological resources review for the fenced portions of the 200 Areas was conducted in 1987 and 1988. Two historic archaeological sites (i.e., can and glass scatters), four isolated historic artifacts, one isolated cryptocrystalline flake, and an extensive linear feature (i.e., the White Bluffs Road) were the only items discovered during the field survey (PNNL-6415). There are no known archaeological or historic archaeological resources within the ATCD Project site. Nor are impacts to archaeological or historical archaeological resources anticipated for this project. The tank farms underwent extensive excavation when the tanks were installed underground and no ground disturbing activities are planned. A staging area for the ATCD Project will be established near the northeast corner of C tank farm in a previously disturbed area. All contractor equipment and facilities will be located in a designated fenced area within this previously disturbed area.

Under Stipulation III (a)(3) of the Historic Buildings Programmatic Agreement (DOE/RL-96-77), activities involving waste storage tanks were exempt from review under Section 106 of the National Historic Preservation Act. Nevertheless, because of the significant role these tanks played in waste management throughout World War II and the Cold War period, these tanks were determined to be contributing properties within the Hanford Site Manhattan Project and Cold War Era Historic District. Consequently, representative single-shell and double-shell tank farms (i.e., 241-AW, 241-T, 241-TX, and 241-TY) were individually documented, and the history and contribution of these structures was described in Section 6 "Waste Management" of Section 2 of the History of the Plutonium Production Facilities as the Hanford Site Historic District, 1943-1990 (DOE/RL-97-1047). Any effects due to modification to the existing tank structures have been mitigated under Stipulation VI of the Historic Buildings Programmatic Agreement (DOE/RL-96-77).

4.11 VISUAL RESOURCES AND NOISE

Visually, the Hanford Site is characterized by wide-open vistas interspersed with over a dozen large industrial facilities (e.g., reactors and processing facilities). The 200 Areas contain several of these large processing facilities. Site facilities can be seen from elevated locations (e.g.,

Gable Mountain), a few public roadways (State Routes 24 and 240), and the Columbia River. Facilities in the 200 East Area can be seen only in the background from offsite locations.

The Hanford Site is an industrial complex and generates noise at levels that are consistent with the various activities conducted within the complex boundaries. Noise levels are maintained within prescribed limits.

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